

# *Reducing Noise in Digitized Disk and Tape Recordings using Audacity*

## Opening up a pre-recorded file in Audacity

1. Launch *Audacity*. (**Start** => **All Programs** => **Audacity**). If *Audacity* is not already installed on your computer, refer to the handout "How to Install Software used in the Digital Sound and Music Workshop" for instructions.
2. Put the *Digital Sound and Music* CD-ROM into the computer's CD-ROM drive.
3. Select **Project** => **Import Audio...** Click in the "Look in" menu at the top and select the CD drive (the icon looks like a round CD disk).
4. Look in the list for the folder named "Old Records". Double-click on that folder or click on it once and click **Open**.
5. Open (double-click on) "Original".
6. The waveform will be displayed. To play it, press the **spacebar**, or click the green triangle  **Play** button. Listen on your headphones so you can hear clearly. As the song plays, the cursor line moves through the waveform.
7. *While the song is playing*, click the **zoom In** button  (looks like a magnifying glass with a plus on it). Zooming in will allow you to see details of the waveform more clearly. You will be able to see the individual notes as they slide by. You will also be able to see some pops and clicks as sharp spikes that stick out from the smoother music waveform. These are caused by tiny scratches on the surface of the record.

## Removing pops and clicks

1. Click the  button to display the entire waveform, then click the green triangle **Play**  button. As the song starts to play, click the **zoom in** button  two or three times until you can see the individual notes scrolling by as the music plays.
2. When you hear a click that you want to remove, press the **spacebar** immediately to stop the song at that point. The portion of the waveform that was playing at that point is displayed in the center of the screen.
3. If you can see the click as a spike near the center of the screen, drag the mouse over two or three notes around that region and click the **zoom to selection**  button to zoom in on that region. Click the **Play** button to play just that region.
4. Carefully drag the mouse over the spike, so that only it is highlighted, and press the **delete** key on the keyboard. Click the mouse at the beginning of that region and press the **spacebar** (or click **Play**) to see if the click is removed.
5. Click **Zoom out**  few times to zoom out and press the **spacebar** (or click **Play**) to continue playing.
6. Select **File** => **Close** and click **No** when it asks you if you want to "Save Changes...".

## Automatic Noise Reduction

1. Select **Project** => **Import Audio...** and double-click on "Original"
2. Drag the mouse over the first 10 seconds of the song and click the **zoom-in**  button. You should see section of "silence" that has only the background noise, e.g. the lead-in right before the music starts, followed by the first few notes of the song.
3. Select (drag the mouse over) the lead-in ("silence") before the music starts.

4. Click **Effect => Noise Removal...** and click once on **Get noise Profile**.
5. Pull down the **Edit** menu and click **Select => All**.
6. Click **Effect => Noise Removal...** again and click **Remove Noise**. The noise reduction process will take about 30 seconds to 1 minute for a single song, more for several songs strung together.
7. To save the entire recording as one song, select **File => Export as MP3...**, type in a file name into the File name box, click in the "Save in" pop up menu and select the desired save location, and click **Save**.

## Comparing other methods of recording

1. Click **Start => Programs => Accessories => Entertainment => Windows Media Player**. This is a general-purpose player application that is supplied with all Windows machines. It can play most types of music, sound, and video files.
2. Click on the **Now Playing** tab on the upper left corner of the Windows Media Player window. (If that's not showing, click on the little skinny "Show Taskbar" button on the left edge of the window)
3. Select **File => Open**. If the File menu is not showing, click the tiny round button in the upper left.
4. Click in the "Look in" menu at the top and select the CD drive (the icon looks like a round CD disk).
5. Look in the list for the "Old Records" folder. Double-click on that folder or click on it once and click **Open**.
6. Several files are listed. The following three files are original (unfiltered) recordings of Nat King Cole's "Honeysuckle Rose" from his "Trio Days" album, using three different recording programs and saved in three different sound file formats:

"MusicMatch"	Recorded using <i>MusicMatch</i>	MP3 format
"Cool Edit"	Recorded using <i>Cool Edit</i>	WAV format
"Plus Analog Recorder"	Recorded using <i>Analog Recorder</i>	WMA format

To listen to one of these, click on it and click **Open**. To listen to another version, select **File => Open** and repeat this procedure. Compare the three files listed above and see if you can hear any difference caused by the recording program or by the different formats they are recording in. (Most people can hear little or no difference). Now open the file "Plus Analog Recorder reduced pops and hiss" and compare to "Plus Analog Recorder original". This demonstrates *Plus Analog Recorder's* pop and hiss filter.

7. If you have time, try opening and listening to some of the sound files in "Sound file examples" on the CD-ROM. Put your Sound and Music CD-ROM into the CD drive, select **File => Open**, click in the "Look in" menu at the top and double-click the CD-ROM icon, then double-click "Sound file examples".